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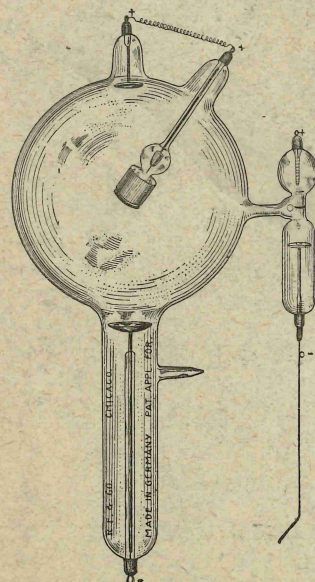
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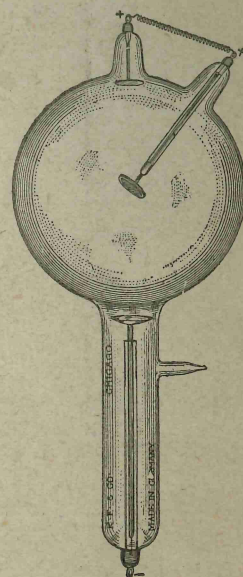
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Vol. III

June, 1903

No. 6

AMERICAN ELECTRO-THERAPEUTIC



AND X-RAY ERA

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PUBLISHER

PUBLISHED MONTHLY

1132 MASONIC TEMPLE, CHICAGO, ILLINOIS
1507 FLAT IRON BUILDING, NEW YORK

Subscription, TWO DOLLARS Per Annum

OFFICIAL ORGAN OF THE CHICAGO ELECTRO-MEDICAL SOCIETY

Entered at the Post Office, Chicago, Ill., as second class matter, August 12, 1902

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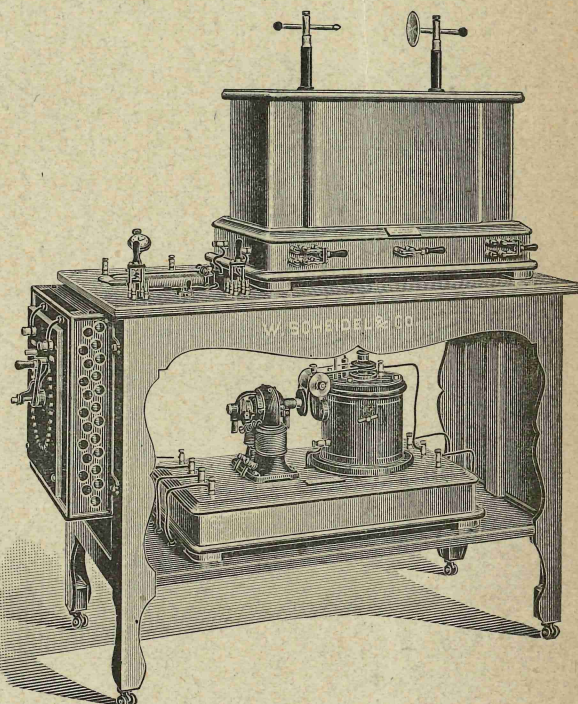
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American Electro-Therapeutic AND X-RAY ERA

OFFICE OF PUBLICATION:
1132 Masonic Temple, Chicago, Illinois

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THIS JOURNAL IS DEVOTED ENTIRELY TO ALL
BRANCHES OF ELECTRO-THERAPEUTICS

Contributions of actual experience by physicians
using the X-Ray as a therapeutic agent are highly
valued by this journal, and the editor is always will-
ing to reserve space for such communications.

American Electro-Therapeutic and X-Ray Era

Vol. III June, 1903 No. 6

Original Contributions.

INJURIES, THEIR X-RAY DIAGNOSIS, CLINICAL AND MEDICO-LEGAL FEATURES.

By J. Rudis-Jicinsky, A. M., M. D., M. E., Cedar Rapids, Ia.

A very important application of the Roentgen ray we will find in connection with expert testimony in the courts in cases for damages, etc. The skiagraphs produced now show us the internal structure of the bones, with most accurate depth and perspective, ligaments, muscles, cartilages, internal organs, foreign bodies, etc., with all the deviation from the normal, and are the absolutely true representations of conditions present, when made properly, and by skillful hands. These facts should be the best and sufficient proof that we have not to deal with a shadow picture only. They are the best advisers, the best experts and give testimony of such a character, that an arbitration between the arguing parties is made more possible with little loss: "*Fiat justitia*," and more reform in the methods of using medical men as experts. Each of the parties in a suit in litigation secures the services of the medical witnesses favorable to him, and leaves the witnesses to justify their testimony as well as they can. Then we have different opinions, antagonisms, and oftentimes self-defeating actions of the medical expert, which have almost brought our profession into contempt. With a skiagraph at our hand, all the clinical data of the case, description how the picture was made, with what tube, at what distance, the time of exposure, and all necessary details in our technique, we may repeat the same

procedure right in the court-room before the eyes of the jury, and furnish a proof of an actual evidence of weight, an evidence absolutely true!

The value of such a testimony is apparent, depending upon the expert's proficiency and learning in skiagraphy with all the knowledge in his profession of medicine and surgery. But this is very far from being the case in practice. None is so well able to judge of the competency of such a medical expert as one in the same profession. Yet medical indorsement of the medical expert is rarely accepted, because there is naturally aroused an idea of professional jealousy, and the most unfortunate thing happens, far too often, that the profession takes the word of a skiagrapher, who is not a medical man, perhaps an electrician, or photographer only with no knowledge of anatomy, etc., instead of seeking the true and scientifically made and explained picture from a colleague, who has given to the new branch of diagnosis and therapy his entire attention, time, experience, and has invested in costly apparatus. Hence there is only one course left; and that is to accept the existing conditions, and aim to correct them by time, education, and example.

Outten says, that an honorable, just compromise should be encouraged, whenever possible, with a desire to strict justice. And here in this field the skiagraph well made, gives us the best opportunities of compromise, a compromise, where honorable professional men rarely disagree, if dignity is maintained, and truthful, manly standard. Compromise will oftentimes permit a much nearer approach to strict justice than a court, which necessarily permits the conflict of truth and falsehood, frequently to the exclusion of justice. Compromise generally offers the purest and best form of economy, when the skiagraph is examined by both sides carefully, and the status present had to be acknowledged, by all concerned; for the plaintiff it takes away the sting of delay and irritating circumstance; for the other side it saves money and reputation. But if a compromise is not possible, and the case has to go before the jury, the evidence of a correct skiagraph is beyond doubt. It is direct evidence, an evidence of a witness that cannot be influenced and is altogether without prejudice. Our only excuse for writing upon accidents and their medico legal conse-

quences is that by attempting a special study of them, the medical and legal professions will possibly be led to give this subject more careful attention, and with the help of skiagraphy obtain absolutely correct diagnoses.

Just to see what the X-rays can do for us let us consider the following cases, which found their way into the courts, the skiagraphs being ordered by the court, and their admission as a part of the evidence, sustained.

Case R. J. A., railway accident. Brakeman injured when coupling the cars. Three ribs fractured on the left, over the heart, and on account of constant irritation the lungs inflamed and painful. Skiagraph made; exposure ten seconds; no lesion found; the ribs over the heart not fractured at all. Lungs are transparent on both sides, proof that they are healthy. The heart shadow shows very well, the apex in normal condition pointing to the left. Just to compare fractured ribs with those normal a smaller skiagraph of another case was used for illustration. When these findings were announced the case was compromised on the basis of traumatic neuroses.

Fig. 1. Case Miss H. against a city. She slipped on icy sidewalk and made the city responsible for it, asking for \$10,000 damages, and claiming a fracture of the right external malleolus, with permanent deformity, the foot being drawn inward. Medical and X-ray examination ordered by the court. The medical examination showed beyond doubt that the plaintiff was suffering from hysteria, or that we had in this case "a hysterical joint," and the skiagraph, giving all the structures of the bones with a beautiful depth and perspective proved that there is not and never was a fracture at all in the ankle joint named.

Fluoroscopic Examination.—Right ankle; the fibula not broken; examined the whole length and circumference of the bone; no Potts fracture. The end of the fibula, or the external malleolus not broken at all, and never was fractured, the bone being smooth on the surface, and the marrow cavity regular, absolutely no roughness or callus formation; no fissure or stellate fracture; the external malleolus normal, no diseased condition of the bone and no splinter separated from the external malleolus or any other small fragment detached from

the same or the internal malleolus. The tibia found in good condition, no fracture; same with astragalus; os calcis; cuboid; scaphoid; internal, middle and the external cuneiform bones; the metatarsal bones and phalanges. Phalanges are deformed due to pressure of the shoe. At the articulation of the first metatarsal bone with the phalanx a compact, hard, bony tumor, consisting of solid bone, being the ultimate stage of cartilaginous tumor, usually due to pressure. It is at the favorite locality, at the great toe, other bones being not affected.

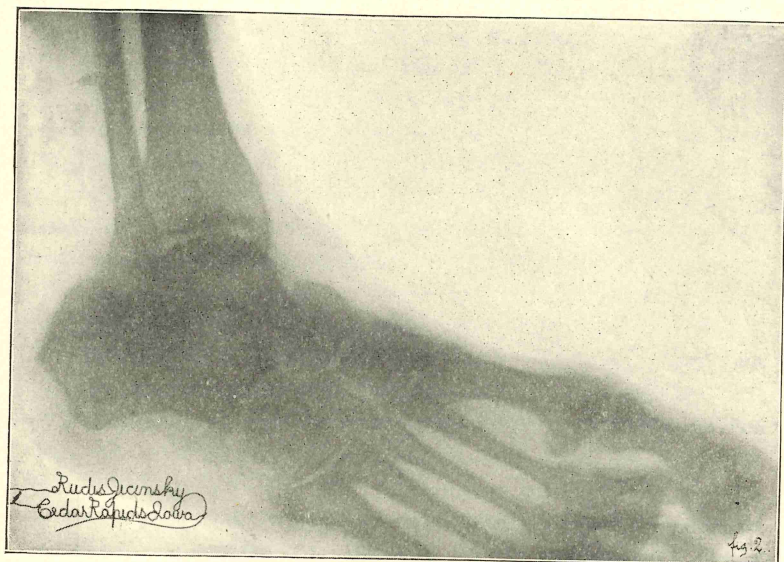


FIG. 1.

Description of the Skiagraphs.—Same case. Static machine used for excitation of the Improved German Tube, No. 3. Extra large size. Cramer's X-Ray plate employed, 8 by 10 inches. Two exposures made, first the external malleolus of the fibula directly against the dry plate, second the internal malleolus of the tibia as near as possible to the plate. Distance of the tube 15 inches from the plate. Bare foot, the ankle being directly under the anode focus point of the best rays, to secure essential correctness, and a good diagnostic field. Anode red hot and at its best in horizontal position, the plate

parallel to the same, the axis of the X-rays perpendicular, securing the best penetration with beautiful illumination of the ankle in proper position with the object in view to secure not only simple shadows but the internal structure of the bones, substance and perspective, individual layers of the muscles, ligaments if possible and all the detail. Exposure with the steady light and a brilliant glow in the tube. Bare ankle with external malleolus against the plate in envelopes—more to the right. My name in gold wire, and address laid on the plate, on the right side for identification of the negative; about four inches of the fibula and tibia on the plate, counting from the ankle. Plate developed by a photographer the usual way. Negative explained as follows: Right ankle. The sensitive plate after being exposed is called negative, because all the dense portions of our subject are shown as being transparent on the glass and the transparent portions of the subject are shown as being dense on the plate. These relations are rectified, however, in the print, which instead of being a negative has become a positive view. In X-ray photography the right ankle exposed will appear as a right ankle on the negative, but when printed, will have its position reversed so that it looks like a left ankle. There is no evidence of a fracture of the tibia or fibula, or any other fracture. All the bones are in good condition, showing the internal structure, substance of the bones with depth and perspective. The shafts of the bones are smooth and not rough or irregular as in case of fracture old or new. There is no callus formation on either of the bones, especially none on the external malleolus, which is perfectly normal. No fissure or stellate fracture. The marrow cavities of the bones are regular. There is no dark or white line in the bones, or their cavities, no mark of an old or new malleolar fracture to show a splinter separated from the external malleolus, or any fragment detached from the internal malleolus. There is no evidence of a fracture to four inches above the lower extremity of the fibula or tibia, or along the whole shaft of the bones; no fracture in the astragalus, os calcis, cuboid, scaphoid, internal, middle, and the external cuneiform bones, the metatarsal bones and phalanges. The articulations in the joint, tarsal and tarso-metatarsal, are perfect. There is absolutely no evidence of any fracture at all,

and never was. The shadow of Tendo Achilis is plain, not so the other layers of muscles, as Peroneus longus, Peroneus brevis, Tibialis anticus, Extensors, Flexors, etc., and the annular ligament. Phalanges are deformed due to pressure of the shoe. At the articulation of the first metatarsal bone with the phalanx a compact, hard, bony tumor, consisting of solid bone, according the shadow laterally to the head of the first metatarsal bone, and another one right over the same. The other bones of the foot not affected.

The usual examination of this case showed beyond the doubt by all tests, including the electrical test, that we had to deal with a hysterical joint occurring in traumatic neuroses, as the plaintiff claimed, beside the fracture, which never existed. There was not very great local distress at the ankle, but some pain at the hip; no swelling or redness, or pain to prevent passive movements, while active motion was next to impossible to accomplish. The parts around the joint were normal in size, but under the exceptional circumstance, being not used for many months, the internal muscles have undergone slight atrophic changes, having lost their elasticity, sensitiveness, and appearance, the foot being drawn in, as stated already. With the application of the galvanic current the muscles responded nicely and the foot could be brought in perfect normal position. At the hip there was an excessive hyperaesthesia of the skin, the slightest touch there produced pain. The pain seemed to be confined to one spot, near the acetabulum. This pain is seemingly intensely exalted when the patient is watching and noting the progress of the examination; but when blindfolded, well-pronounced pressure can be applied over the painful area. The whole trouble is therefore of a functional character. The jury gave the plaintiff a verdict for \$5,000, assuming perhaps correctly that the present state of conditions was due to a trauma anyway.

Figs. 2 and 3. Case J. M., railway injury. We realize that in treating of railway injuries we are not describing new and unknown affections; for, in general, the injuries done upon railways differ from those inflicted in other ways, only in degree and circumstances. At times, however, the intensity of the forces and the peculiarities of the circumstances of work, place railway injuries almost upon the plane of specialism.

In our case the man in question, fell from a box-car, arriving on the ground with both feet at once, flat. After elapse of a half year he cannot walk, both ankles are tender, and one spot on the left (Fig. 2) especially painful. He was advised to use two metallic plates in his shoes, and with the help of a cane he walks, but with much difficulty. It was Montaigne who said: "The thing in the world I am most afraid of is fear, and with good reason; that passion alone, in the trouble of it, exceeding all other accidents." And this case seems to be the

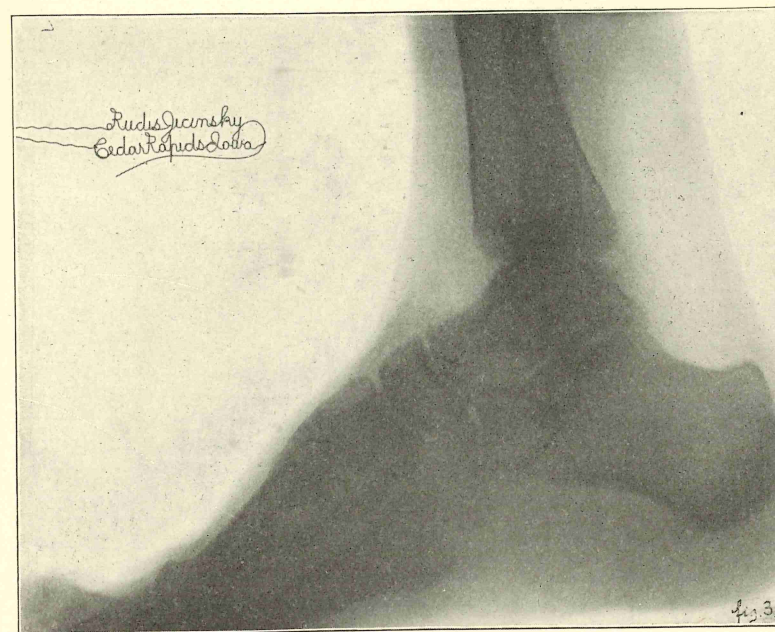


FIG. 2.

best illustration of it, giving us not only all the symptoms of traumatic neurosis, but the fear as a cause of psychic trauma with all the fear as regard to the future. The case was diagnosed as distortion of the ankle-joints, but the Roentgen rays, of course as usually, disclose the true condition. There is a plain fracture of the astragalus on the left, on the internal side of the bone, and the fragments are not united. Treatment consisted of application of all kinds of liniments, etc. The fluoroscopic examination gave us a peculiar shadow at the

inner border of the astragalus on the left, but the skiagraph explained the painful spot at once. There is some laceration of ligaments at the body of the same bone, the laceration giving marked and uneven haziness. The negative is certainly better, giving the details more perfect, but nevertheless we see the internal structure of the bones, the marrow cavities, the substance and depth with beautiful perspective, the pictures being made on comparatively very short exposure. On the right

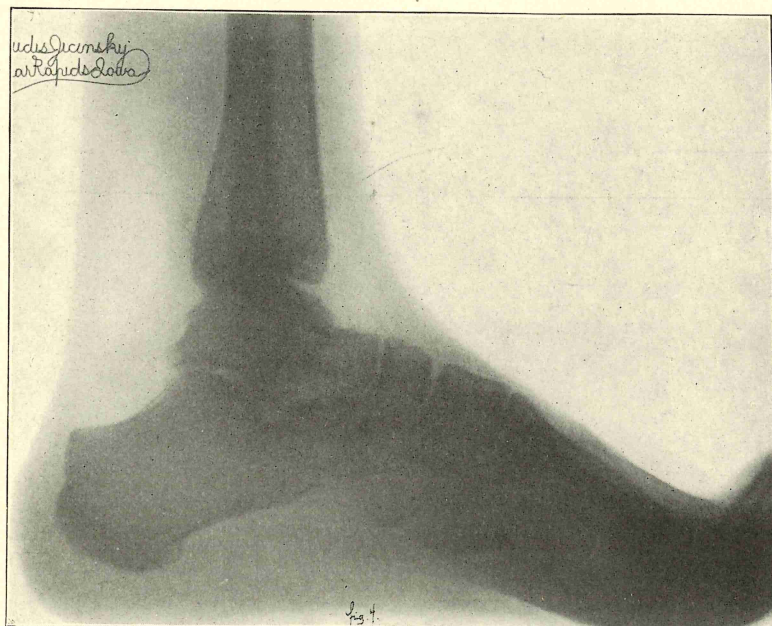


FIG. 3.

foot (Fig. 3) there is a peculiar haziness behind the tendo Achilis, showing a laceration of the ligaments near the astragalus, and also at the planter side of the foot. Otherwise the description of the pictures would be about the same, as in the other case of ankle, described above.



THE EVIDENCE OF ARSENIC AND INORGANIC POISONS AS DETERMINED BY THE X-RAY.

BY DR. MED. G. BRAUTLECHT, BREMEN.

The Roentgen ray has not only proved itself of great value as a therapeutic agent, but it is soon to become indispensable in forensic medicine.

Physicians are now equipped with a splendid method by which they may in difficult cases, to be examined for mechanical injuries, obtain the most exact diagnosis. Aside from this, however, the utility of the rays is shown in determining adulterations such as flour, coffee, saffron, etc. It will be of equal value in ferreting out the inorganic poisons which are now found in our daily consumption of food elements which threaten the life of mankind.

Assuming, as is well known, that all such bodies, which have a high atomic weight as well as a high specific weight, are more opaque to the Roentgen ray, I deemed it expedient to prove by means of the X-ray such inorganic elements in the body inasmuch as these elements are difficultly soluble.

For many reasons I directed my attention principally to the detection of arsenic and its compounds, and more particularly to the frequent cases of poisonings by arsenical acid and paris green, which, owing to their great toxic effects, stand foremost in this sphere. It was to be assumed that by reason of the high atomic weight of this metalloid, even a very small quantity, if not already dissolved, would be amenable to the Roentgen ray. In fact, the arsenical acid may be dissolved in a very insignificant portion, and but very slowly in water, as Taylor shows in the following condition:

In cold water.....	i: 500-1000
In warm water	i: 400
In boiled water, for 1 hour....	i: 24
In tea and beer.....	i: 1000
In coffee and brandy	i: 500

We have already very accurate chemical and biological tests for arsenic which may not be dispensed with in the future in any case, but, the Roentgen-ray test can materially aid the otherwise tedious analysis and show the deleterious poison

in bodies as well as poisoned food in a shorter time. It is certainly a great advantage if one may at once detect by an X-ray illumination the insidious stuff. It cannot be under-rated that the court physician is thus enabled to prepare his preparatory statements, when a suspicion of poisoning is manifest and for substantiating the same in subsequent proceedings. Of special value will this Roentgen-ray method be for demonstration of incriminated objects before the judge or jury.

Arsenic, a metalloid, has an atomic weight of 74.9, and its specific weight is 5.73. It follows that its diascopic image must be at least as near as sharp as that of iron whose atomic weight is 55.9 and its specific weight 7.84. I became aware of this through my tests as follows:

Some grains of arsenic were given upon a spatula to a squirrel which it chewed and swallowed. It died with the usual symptoms after five hours. The body was illuminated and photographed. It was shown that the most minute particle of the metalloid, which in several positions was but a fracture of a milligram, gave just as deep a shadow in the squirrel as an equal sized pellet of iron might show. The corresponding limited arsenical acid contents (As_2O_3) must therefore become relatively a thinner shadow on the radiograph. In 100 parts of this substance, 75.78 are As, and 24.22 O. Paris green is a combination of Scheele's green (CuHAsO_3) and acetate of copper oxide, $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)$, as well as Realgar (As_2S_3) and Orpiment (As_2S_3); hence, other arsenical combinations must give corresponding clearer shadows of which I have ample evidence with my investigations.

A dog was given a larger quantity of arsenical acid, mixed with raw meat. The dog thereupon vomited quite forcibly, so that at a later section no trace of meat or food particles were visible. Notwithstanding this, the animal died after eight hours with the symptoms of a typical arsenic poison. The radiograph showed likewise the poison in the stomach and along the alimentary canal quite plainly, but the shadow is less intensive than the one of the metallic arsenic as shown in the first figure.

The second picture exhibited the extirpated stomach, and viscera of the dog; it was seen that even the smallest particles

of arsenic are manifest after illuminating the animal entirely. Aside from this, I also diascope the vomited sputum and the excreted feces, which I collected upon celluloid saucers for photographing. In both instances, as was anticipated, the poison was plainly discernible.

The Roentgen picture, taken from an excised stomach of a human being, would prove to be an important adjunct in a judicial investigation.

Since I obtained no cadavers of persons who died from arsenic poisons, I had only recourse to human corpses in which I introduced at a post-mortem examination, a quantity of arsenic acid, mixed with water that was infused through the oesophagus into the stomach. The radio-gram of the body showed no traces of any elements, nor was my repeated effort upon a very emaciated body more successful. This negative result is plain enough if we consider that in these experiments, the arsenical particles were necessarily of microscopic size and were embedded in tissue of considerable density.

A very good picture may be obtained, however, if the stomach were alone photographed, in which the arsenical particles are invariably reproduced. The results I obtained by my diascopic examination from poisoned foodstuffs, such as rye, whey, bread, meat, sausage, spinach, etc., in which I succeeded in exhibiting most beautifully the suspicious shadows. Thus, I observed in a combination, some spinach mixed with paris green as also in a rye-whey in which I had infused 1 gram arsenical acid. This mixture was allowed to remain intact for 24 hours and subsequently radiographed. It was shown that the arsenical acid for the most part remained undissolved and that the minutest particles were discerned by means of the Roentgen ray. I made the same attempt with the sublimate and rye-whey (1:100). This, I likewise allowed to stand for 24 hours, but, in this the radiograph exhibited that the poison was totally dissolved; not even the least particle in the rye-whey was visible. (Dissolved sublimate is as 1:16 in cold, 1:3 in boiled water.) A radiograph was made of a piece of meat with bones about 2 cm. thick, into the middle of which a centigram of arsenical acid was introduced while a decigram of the same poison was infused into the bones

and then radiographed. While the other organic combinations, and notably the meat have a specific weight, which is about the same as that of water, and while the compound organic combinations are generally elements with a lower specific weight, such is not the case with bones. These latter contain principally calcium (atomic weight, 39.90; specific weight, 1.587) and phosphorus (atomic weight, 30.96; specific weight, 1.83). If we now compare the weight of these elements with those of the arsenic, the atomic weight of the same is somewhat double while the specific weight is about four times as great as the above mentioned elements. It follows therefore that the arsenic will reveal itself in various places, even if surmounted by bones.

It is evident that the radiograph cannot furnish any evidence of the exact amount of arsenic in any tissue; the radiograph is of use only in preliminary work. Deep shadows will be shown by all the substances of a heavy atomic as well as a high grade specific weight, *e. g.*, calomel, bismuth and tartar emetic. To estimate from the depth of the shadow-graph any result may not be permissible, since the exposures, the thickness of the subjects, the strength of the Roentgen ray and the further preparations of the plate form important factors against exact conclusions.

If now, before the installing of the chemical investigations, one has particular parts of the body or food elements in which the poison was contained and was radiographed, before the chemical analysis destroyed them, we have then a splendid helpmate with which we may show to the court or jury the presence of the poison in conjunction with the chemical analysis. Under certain conditions, the absence of the arsenical shadow may be of great value. During diagnostic dissection, shining albuminous kernels are frequently seen in the stomach and viscera of poisoned persons, which might be thought arsenical particles. Such a case I witnessed at a judicial investigation, when a deposit of powder-like substance was seen upon the outer wall of the stomach, and under the lower side of the liver, which the demonstrators believed consisted of fat acid salts, while later a consulting chemical expert declared that the substance consisted of arsenical particles, since during the analysis with the Marsh apparatus a faint glimmer

of arsenic became visible. It was, however, shown after four hours that this very faint arsenical mirror was due to arsenical reagents. (Murder trial, Kash, Bremen, 1901.) Such cases of deposits may give rise to discussions, which can assuredly be avoided if the X-Ray is primarily applied.

The Roentgen ray may likewise prove a valuable auxiliary, as may be shown in the following procedures: I radiographed some arsenical pills. The picture showed a fine dotted surface. Subsequently, I secured a number of various pills, which I likewise radiographed upon the same plate. The several pills comprised the following:

1. Pil. Ferr. Carboni.
2. Pil. Bismuth Subnitr.
3. Pil. Ichthyol.
4. Pil. Aloe et Ferr.
5. Pil. Ferr. Jodat.
6. Pil. Chin. cum Ferr. Lact.
7. Pil. Asiatic.
8. Pil. Ferr. Lact.
9. Pil. Ferr. Redact. cum Chin.
10. Pil. Kreosot.

After I was enabled to develop the plate, I could at once single out the dotted arsenic pills. These observations exhibit a parallel to the investigation as they are employed with the X-ray for determining imitations of precious stones, coffee beans, etc.

The arsenic combinations owing to their giving deep shadows are specially designed for the topographical demarcations of the soft parts, such as oesophagus, stomach, alimentary canal and trachea. These may not be applicable in practice owing to their extreme toxic qualifications, but when applied to animals, render many interesting data.

I also obtained likewise through the arsenous combination better results than with most other preparations, with which I obtained the contours of the stomach and the alimentary duct in animals by the radiogram. It depends somewhat upon the severe vomiting phase which supervenes and when the arsenous combinations are generally disseminated on the stomach walls, while the paris green more particularly shows

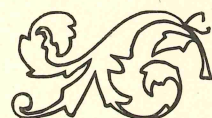
a greater adherence than most other poisons, since it combines with the saliva and thus penetrates intimately into the inner stomach cavity, which cannot be dispelled by large quantities of water.

A squirrel, to which I gave a larger quantity of arsenic acid, died after nine hours. The entire contours of the stomach and accompanying alimentary parts exhibited themselves in a most attractive manner. The dog to whom I gave paris green died after nine hours after some severe attacks of vomiting the contour of the stomach was clearly shown in the radiograph.

May I now recall your attention to the following result: I gave to a dog a quantity of paris green, which is known to be a very fine powder. The dog died after about ten hours. In the dissection, it was found that the windpipe had been completely coated with the paris green, which the animal had respired into the windpipe. After closely examining the Roentgen radiograph, I noticed how the windpipe was plainly marked in the diagram.

It will remain a question for future tests to distinguish a body of higher specific weight, which is not dangerous to organisms. Such an attempt has already been made, and to show how a fine dissemination of any element is manifest over the secretory surfaces, and at once administer an emetic.

(Translated from Fortschritte auf dem Gebiete der Roentgen Strahlen.)



RADIOTHERAPEUTIC OBSERVATIONS.

JOSEPH ZEISLER, M. D.

Professor of Dermatology, Northwestern University, Chicago.

(Abstract from the Journal of the American Medical Association.)

The author mentions the two opinions held by radiotherapists regarding the active principle emanating from the Crookes tube. He believes with Kienboeck that the X-ray themselves are the efficient agents and not the electro-static discharges as held for some time by Freund. He uses an induction coil, mercury-spray interrupter, a voltage of from sixty-five to eighty-five and an amperage of one and a half to four in the primary. He regards these figures of little value for comparative purposes unless an identical machine is used. The essential element is the character of the X-ray obtained from the tube.

METHOD OF ADMINISTERING THE RAYS.

"Two principal methods of employing the rays may be mentioned. The one first advocated by Schiff and Freund, and followed by Pusey, is to use a soft light in short sittings in frequent, even daily, intervals until a reaction sets in. This is surely a safe method though rather slow in many cases, and as for out-of-town patients, who come for an occasional treatment only, quite impracticable. The other plan, according to Kienboeck, is to give what he calls a normal exposure, *i. e.*, the use of a powerful light for a period of about twenty minutes in a single sitting, after which an interval is allowed and the reaction is waited for. One such normal exposure will often be sufficient to produce the dehiscence of hair from the radiated area. This method requires a good deal of experience. I have followed it repeatedly and have never had any serious consequences. I have more often, however, taken the middle ground and have used ten-minute exposures at intervals of a day or two to the number of from five to eight, when usually a decided reaction would take place. The proper method to be followed will depend to a large measure on the nature of the case and other circumstances, as I may mention later on. Whoever is making extensive use of the Roentgen rays is bound to have, sooner or later, some

unpleasant experience with the much-dreaded X-ray burns. This is due to the well-known observation that the effect of the radiations is cumulative and that the reaction, even after powerful exposures, requires eight to ten days to become at all noticeable and will then gradually reach its climax within the following week or two. Unfamiliarity with this important fact may lead the beginner to persist in continued strong exposures up to a point when damage can not be undone. The three or four cases in which I produced a powerful reaction, consisting in acute dermatitis with oozing, crusting, etc., yielded readily to simple treatment within a week and caused little anxiety to either patients or myself, and left no permanent injury. I have never caused any sort of ulceration or sloughing. This may be explained from the fact that the light from the soft tube, which I have employed exclusively, has a rather superficial effect and does not penetrate into deeper tissues. Yet I feel that in the future even temporary dermatitis will easily be avoided by me, and my remarks may serve to keep others from similar accidents, for the ideal way of using X-rays in the majority of cases is surely to produce our results with the least irritation. In this connection a word about individual idiosyncrasy may not be amiss. Kienboeck believes that there is no such thing. Still the time required to produce a reaction surely varies in different patients, and particularly is there a notable difference in the resistance in various tissues. Pathologic cell aggregations, for instance lupus nodules, will be influenced much more readily than normal skin."

REPORTED CASES.

During the period of six months, 81 patients were subjected to radiation; one case each of lupus vulgaris, lupus erythematosus, scrofuloderma, all three showing marked improvement but still under treatment; 34 cases of acne of all forms, 9 cases of epithelioma, all showing symptomatic recovery; 4 cases of eczema, 3 of psoriasis, 2 of hyperidrosis nasi, 11 cases of hypertrochosis, 4 of sycosis, 3 of keratosis palmaris, 1 of pruritis, 1 of clavus, and 3 of non-dermatologic affections.

We give in full the author's remarks on several of these lesions:

HYPERTRICHOSIS.

"I have often heard the remark from colleagues engaged in this line of work that they consider the treatment of hypertrichosis by Roentgen rays as a very delicate and uncertain affair. One of them, in answer to my direct question, once mentioned that he had given over seventy exposures to a woman thus afflicted. My own experience in the eleven cases thus treated have made me rather optimistic concerning what can be accomplished here. I have invariably made use of what has been before referred to as normal exposures, and have found that three to five such exposures, given at intervals of a week or two, will produce complete epilation. As several of my patients were living out of town and could come for a treatment only at long intervals, this method was the only one to be selected. The reaction consisted, as a rule, in marked pigmentation and temporary erythema which yielded gradually.

"My patients have all been instructed that the epilation following one series of treatments is not to be considered as permanent, but that radiations should be resumed at intervals of, at first, two months, and later on longer periods without waiting for a return of the hair.

"Whoever has had much experience in the electrolytic destruction of superfluous hairs will be bound to consider this new method a veritable boon to both operator and patient. One lady, with a very extensive growth all over the chin and somewhat on the cheeks, and who had formerly received many electrolytic sittings at my hands, remarked to me, after her third X-ray treatment, when all the hair from the radiated surface had fallen out, that she would never under any circumstances again submit to the electric needle.

"As regards the final effect on the skin, I have been unable in my cases to verify Ehrmann's observation of an atrophy of the skin following this treatment."

ACNE.

"The thirty-four cases mentioned above comprise several varieties and all degrees of severity of acne. Five of them were instances of acne rosacea; one belonged to the type of acne necroticans; four cases were indurated and pustular acne

of the back and shoulders. The bulk of them were, of course, of the ordinary type of acne of the face, many of them of the very severest and most rebellious nature. It would entirely surpass the intention of this communication to go into details of all these cases. I would only remark in general that their management differed considerably from that employed in the previously named affections, in that the exposures were rather mild in character, the distance of the tube, according to its light, being from 20 to 40 cm.

"My plan in these cases is usually to start in with three treatments a week for from two to three weeks. After this exposures are given twice weekly only for a time, and later on about once a week. A beneficial action can usually be noticed during the second week, when few new pustules are noted and the comedones seem to shrink and dry up. The accompanying seborrhea oleosa of the face is very promptly influenced. Some of the severest cases which I have ever treated were cured in from four to six weeks and have so far remained well.

"If I think of the many years of hard and persistent work which I have formerly given these cases in the way of local treatment, consisting in the opening of abscesses, the removal of comedones, curetting, caustic applications and the like, with but fair results, and compare with that my present management of these cases and its almost uniformly excellent therapeutic effects, I can only regret that Roentgen's wonderful discovery was not made twenty-five years ago.

"I am not prepared to draw final conclusions from my observations as to the etiologic nature of acne, but my long-held belief, that constitutional causes are foremost in its production, has now become considerably modified."

KERATOSIS PALMARIS.

"I am sure that most dermatologists will agree with me concerning the great difficulty of successfully treating this condition. My own experience, at least, has always been very disappointing. The three cases of this affection which I submitted to radiotherapy were inveterate forms and covered in one instance the palmar surface of both hands, including the fingers, and in the other two circumscribed patches of the

size of a dollar on each palm. The effect of the rays in these cases was, to say the least, surprising. One case seemed perfectly restored after five strong exposures."

CLAVUS.

"Case 4.—About the middle of July I was visited by a young gentleman, 23 years old, who complained that for the past two years his life had been made perfectly miserable by the presence of numerous soft corns on the soles of his feet. The affection was symmetrical and consisted in upward of sixty soft corns distributed over the plantar surfaces of all the toes and the adjacent regions of the sole. While a single corn may be a trivial affection, a trouble like this one surely deserves the earnest attention of the dermatologist. I learned from my patient that all sorts of treatments, including excision, keratolytic ointments, special pads, etc., had been tried in vain, and I therefore resorted at once, as an experiment, to the use of the X-ray exposures. I gave twelve daily exposures with a strong light, at a distance of 10 cm., for ten minutes each. No visible reaction resulted, but the treatments had to be discontinued as I left for my vacation. Three weeks later, when I returned, my patient exhibited his feet to me, and to my great delight he was absolutely and perfectly free from all his corns and has remained so to this day."

The author agrees with Scholtz and others that the rays have special selected action on cathologic cell formations, causing finally the destruction of the cells. He says in conclusion the following:

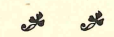
"I can only say that my experience with radiotherapy so far has made me an ardent advocate of it, and I believe that until it is replaced by something still more marvelous it will constitute one of the most effective weapons in our fight against a large class of dermatologic affections."



THE ETIOLOGY OF CANCER.

Notwithstanding all the work done in cancer etiology, one of the best European authorities, Professor Lubarsch of Posen, in Germany, a man who is thoroughly familiar with the whole subject and who has evidently spared no pains to get at all the recent publications, gives it as his conclusive opinion that we are as yet not in a position to say anything definite of the cause of malignant disease. He says that while it is clear that all forms of malignant neoplasms resemble each other so much as to make it sure that if one is due to parasite the others are also, we have as yet no sure evidence that a parasite is the actual causative agent. On the other hand, Professor Lubarsch considers that there are groups of true neoplasms histologically different from carcinomata which yet share with them the destructive properties of giving metastases and causing cachexia, with regard to which, however, a parasitic cause is out of the question. Even in the epithelial group of the carcinomata there are many special classes of tumors whose peculiarities would be very difficult to explain on this score. He adds that even if the etiologic role of parasites in the causation of a malignant disease is to be accepted, there are other causes that must be considered to have at least equal value. Chronic irritation seems, for instance, especially for many epithelial carcinomata, to be an almost indispensable predisposing condition. Without the preparation of soil, developed by frequently repeated irritation, the epitheliomata fail to make their appearance. The presence of embryonal or postembryonal cellular material included in certain parts of the tissue, with a special tendency to take on an excessive formative disposition, seems to be another predisposing cause without which many neoplasms would not develop. In any theory of cancer etiology, then, these conditions and their effects will have to be taken into account quite as well as any supposed influence of parasites. As a matter of fact, it is not definitely settled yet whether cancer may not be originally a lack of vitality in the connective tissue rather than a surplus of vitality in the parenchymatous tissues. The normal state of the cellular tissues consists of an equilibrium of cellular forces so established that the constituents of the supporting tissues and the more specialized cells of the various organs have just enough resistive

vitality to keep from interfering with the growth of one another, or, on the other hand, of permitting overgrowth on the part of their neighbors. Weigert and Roux have insisted that neoplastic formation is usually due, not to an acquired *nisus formativus*—a special new tendency to overgrowth—but to the disappearance of the resistive factors which have hitherto controlled the normal *nisus formativus* always present. A certain amount of neoformative power must always exist in order to keep any organ up to the standard necessary for function, and it is the failure of the connective tissue properly to limit this force that constitutes, under some circumstances, at least, the essence of malignancy. Once cells have acquired the habit of overgrowth, like microbes, they are prone to take on special virulence, and hence the occurrence of metastases and the development of cachexia because of the oversecretion of toxic cellular products.—*Journal A. M. A.*



UTERINE CARCINOMA; ITS TREATMENT BY THE COMBINED USE OF THE FINSSEN LIGHT AND THE ROENTGEN RAY.

George G. Hopkins contributed a paper of the above title to the Philadelphia Medical Journal of February 21, 1903. The patient is placed upon her back and the rays are directed upon the diseased surface through a speculum. He uses a lead screen to protect all the healthy tissues, but when applying the Finsen light the clothing over the healthy parts is sufficient protection. Long exposures can be given with the Finsen light even up to an hour, but only short exposures are permitted with the X-Ray. He mentions two cases where improvement was much more rapid by the combined treatment than when either agent was used alone. The exposure with the X-ray must be especially short after hysterectomy has been performed because there would then be no uterus to partly absorb the ray and the intestines might be unduly irritated.

Editorial.

Very little has been learned concerning the physical properties of the X-Ray since the remarkable papers published by Roentgen in 1896. A new set of experiments, however, has just been completed by Prof. Arthur W. Goodspeed of the University of Pennsylvania, president of the American X-Ray Association, on the secondary radiations produced by the X-Ray.

Prof. Roentgen proved that the X-Ray could not be reflected, but there has been evidence that they are irregularly diffused or scattered in passing through dense substances. Several experimenters have obtained images of metallic bodies that were placed behind the X-Ray plate. A paper was published in one of our issues of Jan., 1902, on "X-Ray Freaks," by T. Proctor Hall, M. D. In his experiments, different metal objects were placed behind the photographic plate, some of them producing dark images on the plate, others light images. Dr. Hall rejected as causes both direct and diffused reflection. He also considered that the assumption of secondary rays would not explain the phenomena.

In the experiments made by Prof. Goodspeed, the X-Ray tube was enclosed in a black box which prevented any optical fluorescence from entering the room while the X-Ray would penetrate the box. Heavy lead plates were placed on the top of the box and the radiographic films were placed upon these plates thus thoroughly protected from the direct radiation. Upon these films were placed various bodies including zinc, brass, wood, hand, etc. In every case unmistakable evidence of secondary action appeared. Prof. Goodspeed also noted the rather peculiar physiological effect of the X-Ray. After sleeping one night in a room in which he had been using the X-Ray during the day, he developed considerable inflammation of the eyes and throat. He noted the same effect on another occasion, but the inflammation subsided at once on changing sleeping rooms. He had at no other time experienced this effect during the day, though he had experimented for hours at

a time with the X-Ray. He attributed this effect to the secondary emanations of the X-Ray from the air or bodies in the room or the human body itself. He notes that this theory would necessitate the assumption that the emanations last for a considerable length of time after the primary rays have ceased to act.

While the photographic experiments certainly indicate a secondary radiation, we think the phosphorescent character of these secondary radiations is not proved. We use the word phosphorescent to indicate that the radiations last for some time after the exciting cause has ceased to act, although we recognize that the term had been applied solely to light radiation. A considerable amount of ozone must have been generated in the room during the discharge of the high tension current from the coil. Prof. Goodspeed notes that the room was nearly or almost closed preventing the free circulation of air. Unless the absence of ozone was proved it is less radical to attribute the irritation to this active agent. We await with much interest a further report from Prof. Goodspeed.

NOTICE

The next regular meeting of the Chicago Electro-Medical Society will be held in room 301 Schiller Bldg. Dr. A. Augustus O'Neill will give a paper on "Electricity in its Relation to Scar Tissue Constituting Urethral and other Strictures." A case of Carcinoma of the Breast will be exhibited by Dr. Elmer E. Prescott. The meeting will begin at 8:15 P. M. A large attendance is desired.

Abstracts and Reprints.

THE X-RAY PHENOMENA AND PHENOMENA NOT DUE TO X-RAYS.

(Abstract from a paper in the Cincinnati Lancet-Clinic by Percy Shields, Cincinnati, Ohio.)

The author first reviews the history of the investigations which led to the discovery of the X-ray by Roentgen. He then considers the various forms of apparatus used to energize the tube. He prefers the induction coil for skiagraphic work and the Tesla coil for therapeutic work. He considers the static machine inferior to both coils. He differentiates between the cathode and X-ray showing in what respect they resemble and differ from each other. He regards both the X-ray and the cathode ray as forms of energy somewhat similar to light. We here quote from the article:

"During recent years views on this subject have been gradually modified, and the opinion is now gaining ground that the atom is not a final and indivisible unit of matter, but that it is capable of being still further split up into particles termed, by Prof. J. J. Thomson, corpuscles. All corpuscles, whether of lead, gold or hydrogen, are supposed to be similar, and that the transcendently fine dust is the elementary matter from which the universe has been built.

"The most advanced theory as to X-rays is, therefore, that they are formed by the almost infinitely minute particles of the cathode stream battering against the platinum target and rebounding outwards at all angles from the point of impact, in the form of a shower of corpuscles. The most active X-rays are projected at an angle of 80° - 90° to the line of impact.

"If we accept the corpuscular theory, then the penetrative power of X-rays depends on the velocity of the corpuscular projectiles, and their velocity will be proportional to the intensity of the cathode stream, which in its turn will be governed by the voltage of the current, tube vacuum, etc., etc.

"With the above theory it might also be possible to give

X-rays and cathode rays a place in the spectrum. It is a well-known fact that but the smallest portion of the spectrum is visible. We know that beyond the violet extends an invisible area, three times the length of the visible portion; how much farther this extends is at present unknown. We also know beyond the red, an area in which heat is developed, extends ten times the length of the visible spectrum. We speak of the various divisions of the spectrum as the thermic, luminous and actinic, all of which merge closely one into the other. Reasoning by analogy, we know that sunlight contains ultra-violet rays; cathode rays and ultra-violet rays are beyond question very closely allied; clinically both produce like results, chemically both affect the photographic plate alike. If by this method of reasoning we can place the cathode ray in the actinic or chemical portion of the spectrum, and since X-rays are but modified cathode rays, then have we not the right to infer that both cathode and X-rays are but another form of molecular or maybe corpuscular vibration, and should be added to the forms of natural forces which, if placed in the order of rapidity of vibration, would be heat, light, chemical, or cathode and X-rays."

RELIEF FROM PAIN NOT PRODUCED BY THE X-RAY BUT BY THE HIGH TENSION CURRENT.

"We will next turn our attention to some of the phenomena which clinically have been attributed to X-rays, that most commonly mentioned being relief from pain. I should like to state at once and with considerable emphasis that neither X-rays nor cathode rays play any role in the control of this symptom. I cannot recall seeing this in any of the literature on this subject, and yet how a fallacy so gross could have been so long countenanced is difficult to understand. It has long been known, and as often described in text-books, that currents of high potential would relieve pain, and yet after interposing a Crookes tube the result is at once attributed to the X-ray. This can only be explained upon the ground that the enthusiasm has been so centered on the visible green glow in the tube as to have diverted attention from anything that

was old. So again we wish to emphasize the fact that relief from pain by a high tension current is old, certainly older than X-rays.

"That a high tension current will relieve pain *without an X-ray tube* can be easily demonstrated. We have on numerous occasions been able to relieve the pain of sciatica, contusions, rheumatism, etc., by simply allowing the terminals of the machine to dangle near the patient just far enough away to prevent sparking. We have also found it impossible on numerous occasions to relieve pain due to gastric carcinoma and gastric ulcer with high tension current, and have been just as unsuccessful in these same cases with the X-ray. I remember very well relieving a shoulder painful from chronic rheumatism with a static spray, again at other times with the X-ray. In fact, we have noticed as constant that pain which could be relieved by the X-ray could just as easily be relieved without the tube, and *vice versa*. Manufacturers to-day make low vacuum electrodes similar to low vacuum Crookes tubes for applying high tension current, which, however, have no advantage over bare wires.

"If we again compare the action of X-rays and cathode rays produced in a Crookes tube with cathode rays emitted by radium or produced by sunlight, we can say that rays from these sources are not pain relieving.

"If, therefore, we can relieve pain without a Crookes tube, and if we know cathode rays from other sources *do not* relieve pain, are we justified in attributing the fact to X-rays? I think, without much further thought, this can be answered by an emphatic '*no*.' The prerequisites for the relief from pain are a high voltage, better coupled with a high frequency current.

"A most reasonable explanation which I would like to offer this evening as to the relief from pain is that the action of a high tension current of great frequency is similar to the relief of pain obtained by vibratory or oscillatory massage. But recently Dr. Mortimer Granville, of London, in speaking of pain in neuralgic affections, compares the pain to musical vibrations. He believes that the more acute the pain the more rapid the molecular vibration in the nerve; pain of a dull and

aching character bespeaks a lower rate of vibration, just as in music to produce the high note vibrations will be much more rapid than for the production of a lower tone. Vibratory massage, he claims, produces an interruption or an alteration in the molecular vibration of nerves, thus relieving pain. Pressure on a nerve causes numbness and insensibility beyond, which this same authority attempts to attribute to a complete blocking of vibration in the nerve.

"I but give this theory for what it is worth. Of one thing, however, we are sure, namely, massage does relieve pain. We also know that the various vibratory instruments in use to-day will relieve pain.

"If the theory of pain and its mode of transmission as expressed by Granville proves to be true, it will certainly lend much strength to the theory that relief of pain is due to counter-vibratory movements produced in the nerve by the high-tension and high-frequency current."

IMPROVEMENT IN CARCINOMAS NOT DUE TO THE X-RAY.

"For the sake of brevity we will consider the action of this agent on carcinomata. Our attention was first drawn to the fact that X-rays were not the curative agent in the treatment of this dread affection by observing the action in four cases of laryngeal carcinoma. Briefly, I can say that all the cases are dead but one, and his time can be counted by days. It seemed to us that if X-rays were curative, laryngeal carcinoma should be the ideal location for successful treatment. The parts are near the surface, and, if judged with the fluoroscope, the light readily and in quantity penetrates the structures. In this we were sadly mistaken. All the cases were unsuccessful. I admit we do read occasionally of a successful case, but I do not believe they will bear close scrutiny. I can further say that all our results with carcinomata beneath the surface were uniformly unsuccessful, and, as we believe, will continue to be so with this method of treatment. The results the world over for deep growths are called either absolutely negative or improving, which must also be considered negative, inasmuch as they all die. The answer to

such a result can only be that X-rays are not curative. Codman, in an article in the Philadelphia Medical Journal, of March, 1902, says: 'So few cases have been reported, and these in such an inexact and hypothetical way, that they seem to be undeserving of record.' Dr. N. Stone Scott, in his excellent discussion of this subject, finds no adequate evidence of existence of such lesions. The writer fully agrees with him.

"We can separate in a degree the active or curative rays from X-rays by interposing a sheet of foil between the light and skin. If this is examined with the fluoroscope we find X-rays in abundance. If this light be applied to the skin no reaction occurs. Again, it has been noted by all observers that a new tube and one of low vacuum is more effective than an older tube of high vacuum. This, again, would seem to indicate that X-rays are inert, inasmuch as X-rays are more penetrating in the old tube than in the new. At any rate, action on the photographic plate is more pronounced. It seems that the effective rays are the cathode rays. These rays are quite superficial in their action. Their action is limited very largely to the skin and subcutaneous tissues. To compare again the effective rays generated in the tube with radioactive radium or ultra-violet light, we are led to conclude that the cathode rays are the ones which bring about our good results in superficial epitheliomata, and, owing to their lack of penetrative power, a negative result has been obtained in deep growths. To sum up the evidence against the X-ray being curative, we can say:

"1. Deep growths are unaffected, although X-rays penetrate in abundance.

"2. X-rays 'filtered' through lead foil affect neither healthy nor diseased tissue immediately beneath.

"3. The similarity of action between radium and ultra-violet light with the cathode rays of Crookes' tube leads us to exclude X-rays as being therapeutically active.

"Beck some time ago mentioned symptoms produced on the part of the general system, such as nausea, vertigo, etc.; in animals he also noticed death followed prolonged radiation. I must candidly admit I can see no definite connection between the above symptoms and either 'X' or cathode rays. Nausea

and vertigo may have been due to other causes and have occurred incidentally to the treatment. We have never had such results in our cases.

"However, both nausea and vertigo as well as death may be accounted for by tissue destruction occurring in the skin layer or those immediately underlying, death in this instance being due to the same cause as burns due to heat, and must not be connected in any way with deep-seated action due to X-rays.

"The last feature to be considered is the bactericidal property of X-rays. There seems to have been quite a number of views on this point, and experiments seem to be decidedly contradictory. Differences in or lack of technique are the only way in which this can be explained. It must not be forgotten in exposing cultures to the rays that ozone is generated in large quantity, and may have possibly been responsible for variation in results. We exposed for variable periods of time cultures of staphylococcus pyogenes, with the result that the experiments were negative; bacterial growth remained entirely uninfluenced. This was also the result as reported some time ago by Zeit, of Chicago.

"In conclusion, to summarize what has been said regarding phenomena due to X-rays and those not due to this agent, we may mention:

"1. Relief of pain is due to the action of a high-tension current and connected in no way with 'X' or cathode rays.

"2. Cathode rays are the therapeutically active agents in the treatment of disease.

"3. Affections beneath the surface, as deep-seated carcinoma, are in no wise affected by X-rays or cathode rays.

"4. The only phenomenon which can be ascribed to X-rays is their ability to penetrate thick opaque bodies.

"5. Bactericidal properties of 'X' and cathode rays are *nil*."

Comments.—In the above article are some very interesting and very natural mistakes regarding the nature of both the X-ray and cathode ray. The statement concerning the theory of J. J. Thomson is correct regarding the corpuscular stream that make up the cathode rays. As stated they are a shower of particles which strike the anode. The X-rays, however,

are not held by anybody to be a shower of particles. Thomson and Stokes together with numerous physicists of England believe that the X-ray is an irregular electro-magnetic wave while light is now considered an electro-magnetic wave of regular recurrence. In a certain sense, therefore, the X-rays might possibly be said to have a place in the spectral field, although because they have irregular wave-lengths they would not be limited to a small area of the spectrum; but most emphatically we can say that the cathode rays are not a form of electro-magnetic wave and they could not have a place in the spectrum. On Thomson's theory the term wave-length when applied to the cathode rays is an absurdity. A number of German scientists hold, that both the X-ray and cathode ray are longitudinal vibrations, that is altogether different from light, but as the paper does not discuss this point I shall not make any further allusion to this theory. Let me, however, state again that cathode rays and ultra-violet rays are altogether different in nature, though as the paper states they both chemically affect the photographic plate, the ultra-violet rays cannot be deflected by a magnet while the cathode rays can. Ultra-violet light is a regular electro-magnetic wave possessing all the properties common to the light wave. The cathode rays are not a wave at all and they have only incidentally the photo-chemical properties of the ultra-violet waves.

We must also dissent from the statement that the X-rays do not relieve pain. We agree with the author that the cathode rays do not because they do not emerge from the Crookes' tube.

We agree with him that the static spray will relieve pain in many cases of rheumatism, sciatica, etc., just as does the X-ray, but the patient may be shielded from any electro-static influence that comes from the tube or the wires coming from the machine and even then the pain will be relieved. I believe that it is too early to state that we find cathode rays in the sunlight or that the radiations issuing from the metal radium and its compounds are the cathode ray. They are rather held to be waves of very short length. Personally I believe that the X-rays are not a simple kind of wave, that the rays emanating from the tube at different vacuums differ

remarkably from each other in their therapeutic properties. I believe that the more penetrative rays, namely those which could penetrate lead-foil, do not possess the curative power which the less penetrative rays exert, and this fact accounts for the observation noted by the author. As I said at first the paper makes some very instructive misstatements, and illustrates how careful we physicians must be when we begin to discuss the problems of physics. Mathematical symbols which are always crowded into articles on electrical research are apt to confuse us.

THE TREATMENT OF EPITHELIOMA OF THE EYELIDS BY THE X-RAYS.*

BY WILLIAM M. SWEET, M. D., OF PHILADELPHIA.

The X-Rays as a method of treatment in certain forms of malignant growths may be considered to have passed the experimental stage, and to have apparently established their superiority to operation in the relief of superficial affections like epithelioma. Apart from their use in the primary treatment of new growths they have a distinct value when employed after operation to prevent recurrence of the diseased tissue. What may be done by the X-Ray treatment of epithelioma of the tissues surrounding the eyeball is evidenced by the cases here recorded.

Case 1. Mrs. G., aged 84, was referred to me on February 14, 1902, by Dr. W. P. Goff, of Clarksburg, W. Va. About 12 years ago a slight roughness of the skin appeared on the side of the nose close to the inner canthus of the left eye. Four weeks later a crust formed, which, upon becoming detached while bathing the face, left a small ulcerated spot, from which a few drops of blood flowed. For several years afterward the process of temporary scabbing over continued without causing much pain or inconvenience, although there was a gradual increase in the ulcerated area. About four years ago the growth began to spread more rapidly, passing upward on the nose and also implicating the eyelids and the tissues of the orbit, the sight of the eye being lost in about a year. With the spread of the ulceration there was itching and con-

* Read before American Ophthalmological Society, July, 1902.

siderable pain, the paroxysms of the latter often lasting for many hours. Numerous ointments and lotions were employed without relief, but all operative treatment was refused.

The condition of the growth when I first saw it is shown in Fig. 1. At this time there was an almost complete obliteration of the conjunctival sac from inflammatory adhesions, the eyeball was atrophic and there was an extension of the growth into the structures of the orbit, but to what depth could not be determined. The itching was intense and the pain would often continue throughout a whole day. Examination of the growth showed it to be a squamous cell epithelioma. After a lead mask had been prepared to protect the face and the sound eye from the action of the rays, treatment was commenced on February 15 and continued daily for periods ranging from five to ten minutes for two weeks, when it was given every second day for one month, and then every third or fourth day for two weeks more. Within a week after the beginning of the treatment there was a decided diminution in the severity of the pain, the discharge was lessened and the area had a healthier appearance. At the end of the third week the size of the growth had diminished slightly, healthy granulations appearing at the edges. The improvement continued, and on April 5 the nasal portion had entirely skinned over, and the palpebral and orbital disease showed decided diminution in size. The picture, Fig. 2, was taken at this time, after a total of 36 exposures.

On April 14 she returned to her home, and the treatment has since been continued by Dr. Goff on an average of three times a week, directed to the diseased tissue of the orbit. The improvement has continued, but the refusal of the patient to permit enucleation of the atrophic eyeball has rendered it difficult to reach all the diseased tissue with the rays.

Case 2. Thomas M., aged 71, was sent to me February 28 by Dr. C. A. Oliver, with the history of a growth of the lower lid of the right side, close to the external canthus, which started 11 years before as a small ulcer. Under the use of ointments the ulcer healed and gave no trouble for

several years. In August, 1900, the disease recurred and continued to spread, notwithstanding all forms of local treatment. The growth was found to be epithelioma. Its appearance at the first examination is shown in Fig. 3. As the man lived some distance from the city the X-Ray exposures could only be given every fifth or sixth day, and extended over a period of four months, 22 treatments in all being given, with the result as shown in Fig. 4.

Case 3. James M., aged 64. Came to me from Dr. C. A. Oliver with a narrow ulceration on the edge of the lower lid of the left eye, near the internal canthus, which had existed for a number of years. No section of the growth was secured, but it had the appearance of epithelioma. After ten treatments, extending over a period of five weeks, there was complete healing of the ulcerated area.

The action of the X-Rays in relieving malignant growths has not as yet been satisfactorily explained. All operators recognize a destructive action of the rays upon embryonic cells, without, however, affecting normal healthy tissue, except under prolonged exposures; but the reason for this selective action remains to be determined. The sections made from a piece of the diseased tissue taken from Case 1, after a number of applications of the rays, and examined in the laboratories of the Jefferson Medical College, showed intense infiltration of leukocytes, although there was at that time subsidence of the early inflammatory symptoms. Over 90% of the cells were polymorphonuclear leukocytes, which were conspicuous in the cancer areas, around the bloodvessels, and in the bloodvessel walls, and as intravascular marginal collections. The epithelial cells showed evident degeneration, the chromatin being fragmented at the periphery of the nucleus, and appearing as fine irregular granules, with reduced intensity of stain reaction.

While leukocytosis may be a causative factor in the cure, the prompt relief of the pain and the fact that the ulcerated area loses its sensitiveness to touch indicates that some trophic change takes place under the influence of the rays. This may be secondary to changes of degeneration in the finer nerve filaments, resulting in decreased vitality and ultimate destruction of the cells of the diseased tissue. That the

X-Rays have a pronounced action upon the nerve structures is seen in the loss of sensation of healthy skin, following too long or too frequent exposures, while as regards the cancerous tissue, large portions may be excised without pain after the part has been subject to the action of the rays for several days.

In employing this method of treatment the healthy tissues are protected from the action of the rays by heavy sheets of tin foil, or by a sheet of lead, about 0.3 mm. in thickness, having an opening corresponding to the size of the diseased area. A tube of low vacuum gives more rapid results than one of high penetration, and should be placed from 6 to 10 inches distant from the part. The exposures vary from 5 to 10 minutes. The closer the tube is to the disease, the more powerful is the effect. Care must be taken not to burn the tissues seriously, a result that may readily follow exposures that are prolonged, too frequent, or with the tube too close. This burning does not usually appear until a week or ten days after any given exposure to the rays.

There is probably no portion of the body in which the value of the rays will be greater than in the surgery of the face, particularly of the eyelids. Their employment will render unnecessary the extensive plastic operations, with disfigurements of the face, which are now required to cover the area after the disease is removed. Even the new tissue that replaces the disease after the X-Ray treatment differs from ordinary scar tissue, having more nearly the appearance of normal skin, and being more pliable and not so liable to contract.

The most uniform results have been secured in the treatment of epithelioma and lupus, although the rays are of value in other neoplasms. Sufficient time, however, has not elapsed since the discovery of the method of treatment to indicate the permanency of the results. I believe that when the treatment is carried out properly and continued for a short time after healing has occurred the disease will not return. Even if there is recurrence, exposure to the rays may be renewed, with results equal if not superior to what may be secured by the secondary operations.—*Reprinted from the American Medicine.*

COMMENTS.

Our readers are familiar with the work of the writer of the paper. He was among the first to demonstrate that the location of foreign bodies in the eye could be determined with exactness by means of the X-ray. It is gratifying that he finds the X-ray of value for therapeutic as well as for diagnostic purposes.



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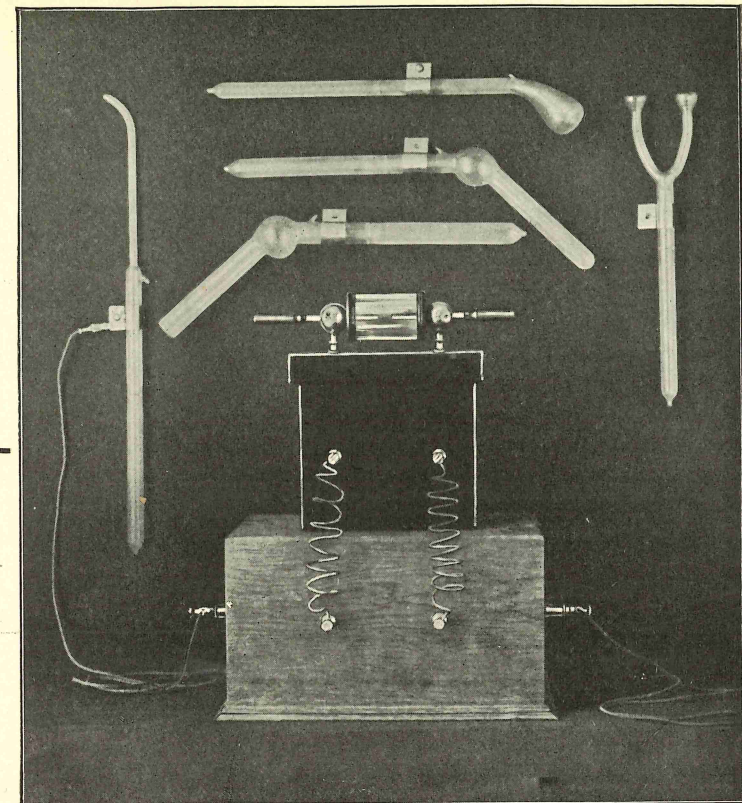
at least. Turning to so-called galvanic electricity, which has been somewhat explored by able and reputable scholars and put upon a comprehensible basis, we find one recent writer speaking of 'a boil that a surgeon had opened, and then the germs got in and the trouble began.' He 'placed a needle in the boil and turned on about two and one-half milliamperes of *negative electricity*," and the cure was speedy, etc., while others are reporting cures of every ailment from chilblains to cancer, and reporting the same with the most ingenuous disregard for the accepted theories of electricity.

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Comments: The above is taken from an editorial in the New York Medical Record. It shows how careful the electro-therapist must be to state his results in scientific language. Any one reading the papers in this and other journals can see that there is a considerable body of careful operators who are not unduly optimistic and who are using electricity in as scientific a manner as any therapeutic agent is now used.



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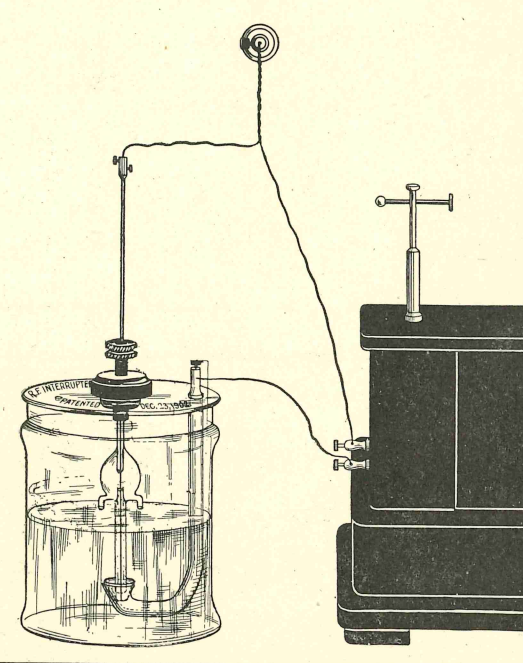
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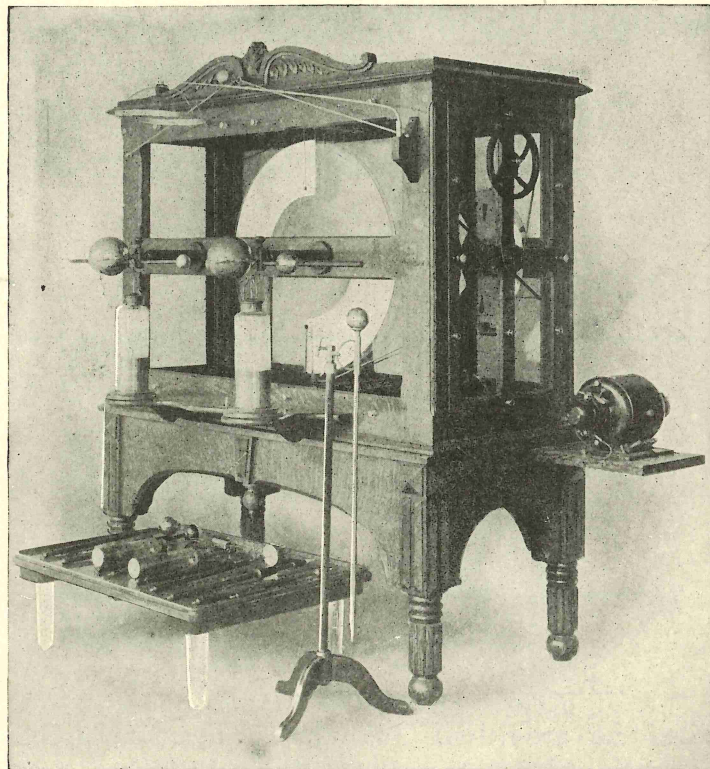
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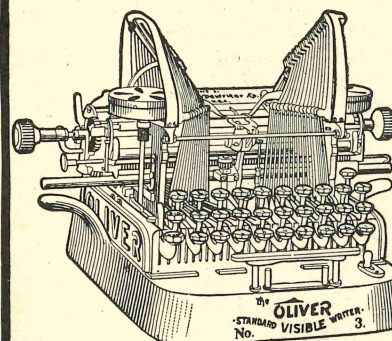
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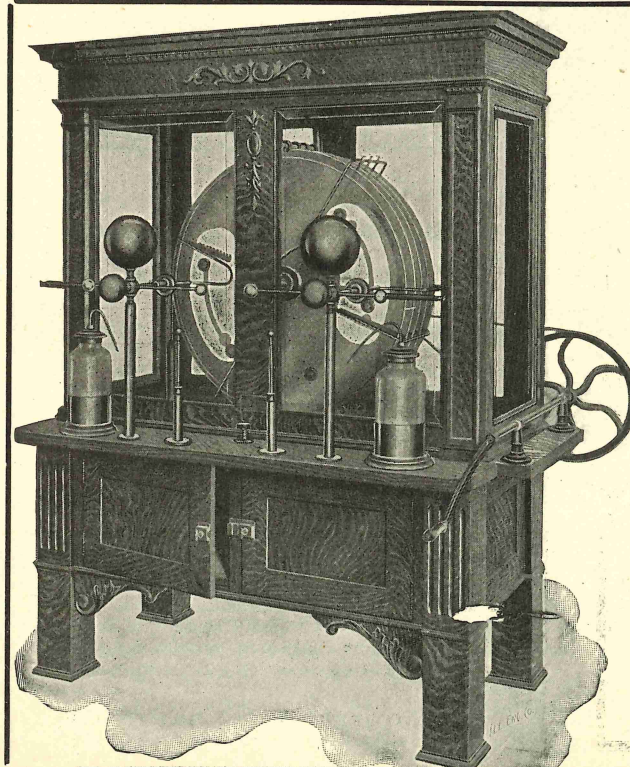
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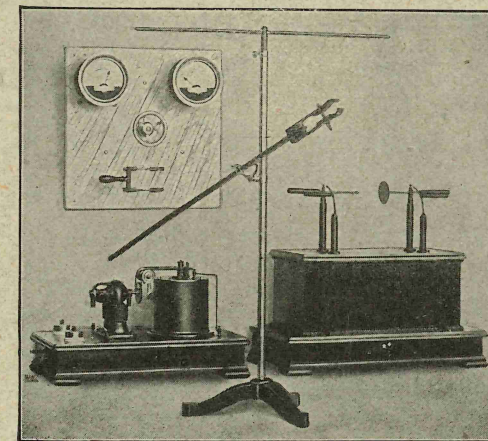
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